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W E T H O D I C A L
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I N J E C T I O N S

Instructions and Descriptions of the
Instruments provided for their Pur-
poses.

By WILLIAM BUTLER, M. D.

L O N D O N

Printed by H. K. B. & Co. 18, Ave. Maria St.

1847

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A
METHOD OF CURE
FOR THE
STONE

CHIEFLY BY

R INJECTIONS.

WITH

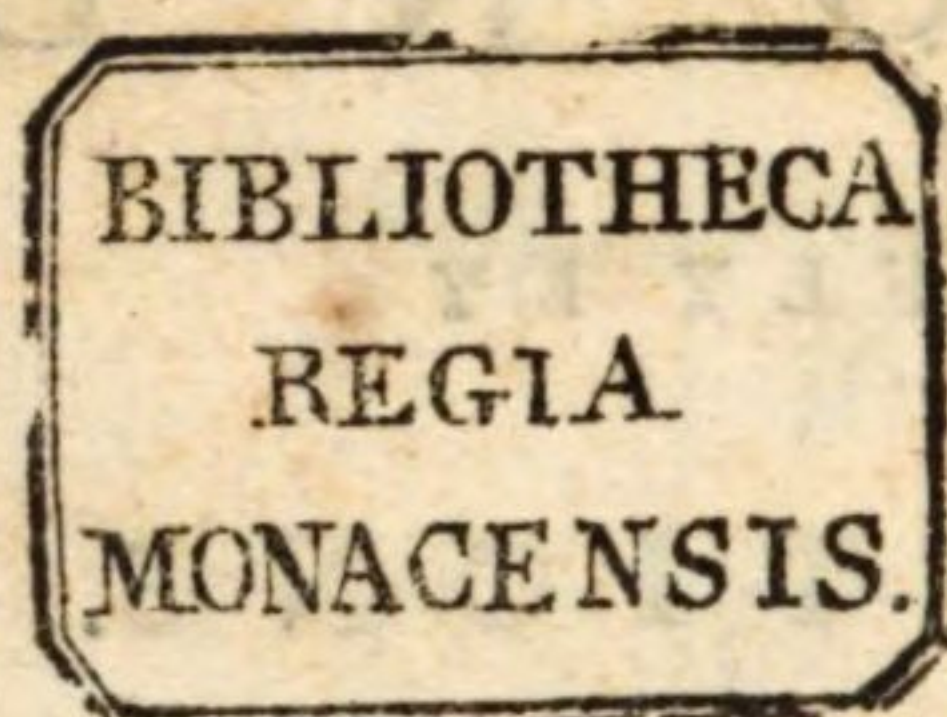
Descriptions and Delineations of the
Instruments contrived for those Pur-
poses.

By WILLIAM BUTTER, M. C.

EDINBURGH:

Printed by HAMILTON, BALFOUR, & NEILL.

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E R R A T U M.

THE sentence immediately following B. in figure 5. p. 14. should be read thus.

THE stopcock, which is made of tin; but its body is fixed into a brass tube, whose external surface is finely polished, and nicely adapted to turn within another well-polished tube of the same metal. Then &c.

THE
CURE of the STONE

CHIEFLY BY
INJECTIONS.

LITHOTOMY has so just-
ly been esteemed a cruel and
hazardous operation, that
no wonder many different attempts
have been made to find out a pro-
per solvent of the stone.—Lime-
water is one that has, as yet, met
with the most general approbati-
on: but even that, as commonly
used, is very slow in its effects;
since it is considerably weakened
by the vital powers, before it reach-
es the bladder in the ordinary
A course

course of circulation.—It is with reason, therefore, that some have wished this medicine could be injected into the bladder; as, in this way, it would act with full force immediately upon the stone.—Accordingly various attempts have been made to this purpose; generally, however, without the wished for success. It was easy indeed to throw lime-water into the bladder; but a method of doing it, so often as might be requisite, without giving the patient any pain or uneasiness, was the thing wanted. Nor, to the best of my knowledge, was this hit upon, till very lately that I got a hint to try how far it was practicable. And a hint was to me sufficient; as I shall ever be ready to contribute my utmost to the relief of distressed mankind.

THE

THE success of my trials I communicated to Dr. WHYTT ; and it was by him made public. But, as further experience has given me greater light into these matters, so I reckon myself bound to publish these improvements without reserve.

'Tis my design, therefore, at present, to new-model the whole of my observations on this head. And, besides adding a great many new things, I shall correct, or entirely expunge, so far as warranted by experience, what was formerly communicated to that gentleman.

THE instrument I first used, was an ivory pipe (resembling *Fig. 1.*) of four inches and an half in length, whose diameter was one sixth, and its bore one tenth of an inch. This I mounted with an ox-bladder,

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bladder, in the common way of a clyster-pipe: and, having poured into it four or five ounces of warm milk and water, and firmly tied the bag, I introduced the pipe four inches into the *urethra* of *Thomas M^c-Cursy*, aged nineteen, a patient in the Royal Infirmary: but, not having as yet attended to all the necessary precautions, (which I could, and did learn only by experience) my first attempts were unsuccessful. However, after a few trials, I pushed first four ounces of milk and water, and afterwards four ounces of milk, into the bladder of this patient, without giving him any pain or uneasiness.

BUT, as this experiment did not answer so well when Dr. WHYTT was present, he ordered a pipe to be made of the same diameter with the
one

one above-mentioned, but of seven inches in length ; as he attributed this want of success to the shortness of the pipe. No ivory could be got so long ; and therefore I ordered it to be made of tin.—Upon this I fastened a bladder as before ; and, having poured into it about eight ounces of warm milk and water, I introduced the pipe into the *urethra* of the same patient, till both the Doctor and I felt the point of it within an inch and an half of the *anus*: then endeavouring to push forward the liquor by strong compression, the bag burst before almost any thing had got into the bladder. And this had nearly put an end to our experiments of this kind. But I, upon reflecting that the Doctor always made me put in double the quantity of liquor I used when by

A 3 myself,

6 CURE OF THE STONE

myself; thought it not unreasonable to impute our want of success, rather to this surplus of liquor, than to any defect in the pipe. And, therefore, for my own satisfaction, I mounted the long pipe anew; and injected, with my usual facility, between the hours of two and eight in the afternoon of that same day, at four different times, into the bladder of *Thomas M'Cursy*, five ounces of tepid oyster-shell lime-water unmixed with any thing. At the last of these injections I sent for the Doctor, and he was present. The injection was sometimes performed in a minute, sometimes a good deal sooner. The same evening, (*June 30, 1752*) the Doctor being present, I injected, in the space of forty seconds, five ounces of lime-water, into the bladder of *Thomas Sander-*
son,

son, aged 30, another patient in the Infirmary. And, further to confirm my opinion, a few days after (*July 6*) I injected with the short pipe, before the Doctor, near five ounces of milk and water, in little more than half a minute, into the bladders of the same two patients; notwithstanding one of them, at the time the injection was made, was affected with a strangury from a blister.

I however intended at first, that the pipe should have been an inch longer; but no ivory could be got of that length. And I still find five inches and an half to be the proper standard for a male, from the age of sixteen upwards, allowing the half inch for fastening the bag upon. But of this more fully afterwards.

THESE

8 CURE OF THE STONE

THESE patients neither complained of pain when the pipe was introduced, the injection pushed, nor when they voided the lime-water; only *McCurdy* said, he perceived a little more *stimulus* than when he used to make urine, but not so much as to give him any uneasiness worth mentioning. They had no inclination to empty their bladder immediately after receiving the injection, and were able to retain it without any difficulty.

Now, tho' the above instrument answered the purpose, yet I found that there were several inconveniences attending it: for it generally employed both my hands, required a good deal of force, and the bag sometimes rushing to a side made the point of the pipe strike against the

the

the tender *urethra*, which never failed to give the patient considerable uneasiness. Besides, I was of opinion that, if the patient could inject the liquor with his own hands, it would be much more agreeable, every way more convenient, and would give him less trouble, than when assisted by another, as it behoved him to be, so long as that instrument was used.— To obviate the inconveniencies, therefore, and supply the defects above-mentioned in my first instrument, I contrived another ; of which I shall give a description and delineation, as I can recommend it by undoubted instances of its success in answering all the purposes intended.

THE

TO CURE OF THE STONE

THE

DESCRIPTION

OF AN

INJECTING BELLOWS.

THIS instrument, as appears from *Fig. 2.* is not unlike to a common bellows ; tho' it differs considerably as to its structure. It is made of well-seasoned mahogany ; and is represented with the bag containing about six ounces of liquor. Its length is fifteen inches, its greatest breadth, including the thickness of the lips, is scarce four inches, and it is represented in the plate of half the natural size, as all the other figures are.

A. The

A. The handle.

B. The neck of the instrument.

What intervenes between the neck and handle, may be called its body.

C. A ring of leather afterwards to be mentioned.

D. The pipes; which are all made of tin.

E. The upper side.

F. The lower side; having lips about an inch deep, within which the upper side of the instrument moves. These lips are intended to support the bag, and hinder it from shuffling to a side.

G. A brass band; uniting, by means of screw-nails, the upper side of the instrument to its neck; whereby its upper moves upon the lower side.

H. The

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H. The bag ; which is an entire sheep's bladder, and is fastened by its neck to a tin-pipe that passes thro' the neck of the instrument.—Upon this is screwed,

I. A pipe having a stopcock ; which, for brevity's sake, we shall afterwards call the stopcock-pipe.—Its diameter is larger than the hole in the neck of the instrument, that the pipe, which lodges within this neck, may be secured from being pulled out of its place by the weight of the bag.

K. The stopcock.

L. The pipe which is introduced into the yard ; and is afterwards to be known by the name of yard-pipe. It slides easily at

M. upon

tween the screw and part to which the bag is fixed.—The leather should be close up to the ridge ; but they are separate in the figure, that both may be seen more distinctly.

FIG. V.

Represents the stopcock-pipe by itself.

A. The end having a female screw ; which receives the male screw of the bag-pipe.

B. The stopcock, whose head or handle is made of tin ; but its body is made of brass finely polished, and nicely adapted to turn within a small well polished tube of the same metal. Then the whole is fixed into the stopcock-pipe as in the figure.—

Brass is used, because tin would
be

be too soft for the purpose of a stopcock.

C. The smooth end; which slides within the head of the yard-pipe.

FIG. VI.

A separate view of the yard-pipe.

A. The head of the yard-pipe; which receives the small end of the stopcock-pipe. The rough external ridge is made for the greater conveniency of a hold in taking it off.

B. Its body; which is gently curved towards the point, for favouring the passage of the *urethra*.

C. The point of the pipe; which swells a little like that of a probe, in order that it may be introduced into the yard with greater ease.

FIG.

FIG. VII.

A crooked pipe to be used with the bellows, instead of the streight yard-pipe, when women are to inject themselves.

A. The head of the pipe.

B. Its handle.

C. The body ; or part of it which is introduced.

D. Its point.

FIG. VIII.

The funnel ; by which the liquor is poured into the bag.

BEFORE we go further, I shall propose another instrument, which, on some occasions, may supply the place of the bellows with advantage.

FIG.

FIG. IX.

THIS differs in nothing from the stopcock-pipe already described and delineated ; except that its great end has no screw, and is smaller, with rifings and depreffions for fastening the bag upon.—It may be mounted with a streight or crooked pipe, as occasion shall require : and let it be henceforth known by the name of our *third instrument* ; reckoning that the *first* with which I injected at the beginning.

IN making the bellows, it will be of use to observe the following precautions.

a. THE edge of the upper side must be every where contiguous to the lips of the under, to prevent the bag getting between them, which

would effectually mar the operation.

β. WHEN the sides are close, they should approach so near each other as only to leave space for the empty bag ; otherways all the liquor will not be evacuated : whence we cannot be so exactly certain of the quantity injected.

γ. THE end of the pipe to which the bag is fixed, must lodge entirely within the hole ; so that the upper side may not be hindered in its motions.

δ. THE great end of the stopcock-pipe ought to be of a larger diameter than the hole in the neck of the instrument, for the reason already given.

ε. THE ivory ring is intended to strengthen the neck of the instrument ; as the wood of itself would be too weak. Ivory, the longer it
is

is used, always clings the firmer to the wood ; and consequently, for this purpose, is preferable to most other substances.

ζ. ALL the pipes are made of tin ; which, by experience, I find preferable to ivory, on many accounts.

η. GREAT care should be taken to adapt the screws of the bag-pipe and stopcock-pipe very exactly to each other. Besides, a ring of soft leather should be put on the end of the screw, next the middle ridge of the bag-pipe, to shut up the seam formed between the two pipes when joined together.

SOMETIMES it is difficult to screw off the stopcock-pipe, as the bag-pipe is apt to turn round within the neck of the instrument ; in which case the bag may likewise be torn. But if, while you attempt this, the
ring

ring be secured betwixt a finger and the end of the machine, the bag-pipe will be kept firm in its place; and so all these inconveniencies will be prevented.

By this leather also, any of the liquor, that may fall by while it is pouring into the bag, is hindered from insinuating itself within the neck of the instrument.

8. THERE is no occasion for the precaution of a leathern ring, to shut up the external seam formed between the stopcock-pipe and yard-pipe; provided the one slides so exactly upon the other as to be every where contiguous, whatever be the direction in which it is put on. And this certainly ought to be the case.

AT first, I made the yard-pipe to go on with a screw: but this I found

found inconvenient; as it rendered it necessary for the instrument to be full-mounted before its introduction into the yard; and then that was with much difficulty effected by ordinary patients.

THE bag should be a sheep's bladder, of such a bigness as to touch, all round, the lips of the lower side of the instrument: in this way it is not allowed to stretch so much; and, by consequence, is less apt to burst.

WHEN I first thought of this instrument, I met with great difficulty in contriving a proper bag: and, after trying many different kinds, at length I had recourse to the sheep's bladder; which, indeed, has answered far beyond my expectations. For, instead of being too weak as I apprehended, it grows
always.

always thicker and stronger by means of the lime-water. And I find, that one bag, tho' constantly used, may last a very long time. Only care must be taken, that it be always dry before every operation ; and then, a small quantity of the warm liquor is first to be poured into it, to soften it gradually before its sides are pressed together to expell the air ; otherways it will be apt to crack, and so be rendered useless.

THERE is also another excellency of lime-water. It is, from my experience, an effectual preservative against the itch. The first time I injected lime-water, the patient infected me with that disease ; which, thro' my eagerness to get rid of it, had almost cost me my life by a precipitate cure. This set me upon thinking

thinking what might be done ; as a like circumstance would afterwards very readily occur. In short, I resolved to try bathing my hands in lime-water immediately after the operation ; and it was not long till an opportunity offered, when the event answered my hopes : for, tho' I am remarkably susceptible of the infection, this method proved a never-failing antidote.

I have also cured an itch by bathing the parts affected with this medicine ; which is the only time I have as yet tried it in that disease. Whence it would appear, that lime-water is both a prophylactic, and cure for the itch. But of this last effect I am not quite so certain ; as the disorder was slight and newly caught.

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THE following directions will serve for adjusting the yard-pipe to different ages.

FIVE inches and an half in length is the proper standard for a male, from the age of sixteen upwards, allowing half an inch for the head. One eighth of an inch is a sufficient bore; and, if the pipe is made of tin, the diameter, notwithstanding, may still be one sixth of an inch.

FROM twelve to sixteen, the pipe may be four inches and an half long, its diameter one eighth, and its bore one tenth of an inch.

FROM eight to twelve years, the pipe may be three inches and an half long, its diameter one tenth, and its bore one twelfth of an inch.

I believe it will be scarce practicable to inject any, with advantage, much below that age.

IN

IN the case of female patients, we need not be anxious about the length of the pipe ; and the diameters just now mentioned will likewise answer their different ages.

THE whole pipe should be carefully polished, but especially its point.

FOR making the pipe, tin is preferable to ivory ; as the former can be got every where, takes a finer polish, and is flexible. Besides, it is cleaner even than silver ; except it be pure, and without alloy.

HAVING described the different instruments which I would recommend in this operation, I shall next proceed to give a detail of the necessary directions for using them. And in this I shall be as full and
parti-

particular as possible ; far from being afraid of too great minuteness, since the best instruments, by a wrong application, may come short, by much, of their author's design.

DIRECTIONS

DIRECTIONS for INJECTING INTO THE URINARY BLADDER.

1. THE patient should empty his bladder immediately before the operation.

2. HE must lie in bed upon his back, with his head, at least, no higher than the trunk of his body, his knees half bended, and his thighs asunder.

3. HE should be forbid to restrain respiration, but desired to breathe in his usual way. He must likewise be put on his guard to give no resistance to the injection, when he feels it enter into his bladder ; and to restrain any attempt to make urine, altho' he should at that time have a small inclination to it.

4. THE

4. THE liquor to be injected should be blood-warm, or nearly so.

5. THE bag should be strong, firmly fixed to the pipe, and, after the liquor is poured into it, well tied; otherways it will be apt to burst, or to allow the injection to escape by either ligature.

6. THE pipe should be warmed a little, and greased with some mild softening ointment, such as that of marsh-mallows, or *basilicon**, which I now find preferable to any thing of a thinner consistence.

7. THE operator is to take hold of the patient's fore-skin with one hand, and draw the yard up towards the belly, so as to imitate its natural position when erect; while, with the other, he introduces the pipe into the *urethra*.

HOLD-

* A little candle-grease is, perhaps, as good as any thing.

HOLDING the prepuce, when the pipe is to be introduced, is, by much, the easiest method for the patient: because, when the yard itself is held, the *urethra* is thereby straitened; and this creates unnecessary pain, by the friction of the pipe against the sides of that canal; which, in this case, cannot yield, on account of the resistance made by the operator's fingers. And the other circumstances here mentioned greatly favour the easy admission of the pipe; as the *urethra* is then pretty straight, and its sides quite smooth.

8. THE pipe being introduced, the patient must grasp his yard very firmly with one hand, (always remembering to keep it upon the stretch, and in the same direction;) while the operator compresses the bag containing the injection, by one

or both of his, with a considerable force, in order to dilate the neck of the bladder.

9. THE injection ought always to be about half the quantity of what the bladder is capable of containing; which may easily be determined by measuring the greatest quantity of urine which the patient can conveniently retain at a time.

THIS rule will answer every age and circumstance; and in it no person can err. Whereas the ordering a certain quantity to answer every patient without distinction, (even supposing them adults) may sometimes retard the cure, and often be attended with bad, yea the worst consequences. For, if the bladder can contain more than double the quantity injected, it is manifestly losing time; as the dissolution of the stone

stone in the bladder will be, *caeteris paribus*, in proportion to the quantity of lime-water in which it is immersed. But, if the bladder can contain no more, or very little more, than the injection, of necessity it must be soon expelled, before it has had any considerable effect upon the stone. And there are examples among authors, where the stone filled up almost the whole cavity of the bladder *: the injecting therefore six or even four ounces, in such a case, would not only over-stretch, but even burst that organ, and so hurry the patient to his grave.

HOWEVER, even in this last case, injections are both useful and safe; provided they be exhibited with due caution. For, properly speaking, the

* TULP. observ. med. lib. iii. c. 6. RUYSCH. observ. anatom. chirurg. cent. observ. 89.

the stone does not fill up the cavity of the bladder ; but this last, by contracting, adapts itself to the size of the first.—If therefore the patient be desired always to retain his urine as long as possible, the bladder will soon be rendered more capacious ; when the rule just now laid down takes place.—And it will be proper to inject, at the very beginning, though in ever so small a quantity, a decoction of marsh-mallows ; which, by affording a slimy covering to the stone and internal surface of the bladder, will enable the patient to keep his urine longer ; and, on account of its relaxing quality, that organ will yield more easily to the distending cause.

Most of these directions are common to all the instruments : but, when

when the bellows are used, it will be requisite to add the following.

1. EVERY thing being in readiness, the patient, opening the stopcock-pipe, presses out the air as above directed *, and again shuts it, to prevent its return.

2. THEN the patient, by the help of a funnel, whose small end is nicely adapted to the bore of the stopcock-pipe, is to pour the liquor into the bag. But, to prevent the ingress of the air along with it, part of the liquor must be in the funnel before the stopcock is opened; and it must be shut again before the funnel is entirely empty.—Hence the reason for the caution with respect to the end of the funnel is obvious; to wit, that none of the injection may escape between
it

* See above, page 22.

it and the stopcock-pipe before it gets a free passage into the bag.

3. HE is to lay down the machine beside him, till he introduces the yard-pipe according to the rules just now mentioned; only he is to do all himself.

4. AFTER the pipe is introduced, while he grasps the yard with one hand, he is to lift the machine by its handle with the other, and slide the end of the stopcock-pipe softly within the head of the yard-pipe.

5. THE instrument being now full-mounted and introduced, a free passage is next to be given to the liquor; which the patient is to do, by letting go the yard till he turns the stopcock, and quickly afterwards he must recover his former hold.

HE

6. HE is to push forward the injection with a gentle, but constant and equable pressure.

THIS I take to be of great consequence, whatever instrument be used : for, when the liquor is pushed forwards with interrupted streams, it generally gives the patient great pain, and is, perhaps, one of the most effectual methods for bringing on an involuntary pissing. I think I saw an example of it.—And when the injection is driven into the bladder with a rapid current, it excites in the patient an insuperable desire of throwing it out again ; to which if there be made any resistance, it creates most exquisite anguish.

7. AFTER the liquor is thrown into the bladder, the patient is quickly to remove the instrument, first turning the stopcock to prevent any
remains

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remains of the liquor, that may be in the bag, from running out upon him.

8. HE is to wipe off any moisture that may be on the bellows ; and, after distending the bladder with air, is to reserve all for next occasion, in any dry place, not too near a fire.

NOTHING more, at present, occurs to me on this head ; only it may not be amiss to observe, that the bellows can be of little use to any below the age of fourteen. Such patients therefore will need an assistant, who must differ from other assistants in doing the whole business himself ; as they have scarce strength to compress sufficiently their own yard. But, in these cases, the yard is too small for an operator to get a proper hold of it in the common way ;

way ; which makes some particular contrivance necessary. The following I recommend, as having used it with success.

THE operator is to lay the fore-part of his thumb a-cross the middle bone of the fore-finger of the same hand ; and, the pipe being introduced, he is to apply the groove formed between them to his little patient's yard ; then, pressing it against the share-bone, he is to push forwards the injection as above directed.—On such occasions, I would prefer the third instrument mounted with a straight pipe.

WHEN a woman is to inject, let her hold the crooked pipe by its handle, and introduce its body into the bladder itself ; and then proceed in the rest as before directed.

D

OR

OR, she may use a pipe of the same shape and size with the streight one ; except that it should be only about three inches and an half long.

PERHAPS if the point of either of these pipes was close at the end with slits in the sides like a catheter, it would be introduced with less pain.

BUT I believe in either way there must be pain ; and therefore, to make this operation quite easy, I would recommend a pipe about an inch and an half long besides the head, with a small plate of metal, of a proper form, fixed upon the extremity of its body next the head, and armed with a cushion upon its anterior surface.—This cushion being made to press strongly upon the mouth of the *urethra*, the injection might be pushed forwards, so as to
force

force open the neck of the bladder without any hazard of regurgitation.

In this last case the bellows ought to be used. But, when the pipe is introduced into the bladder, the first or third instrument will do.

THAT this essay may be as useful as possible, I shall now speak a little to the method of cure, so far as relates to the stone in the bladder. And I am the more inclined to do this, as particular directions ought, in my opinion, to be given, with respect to the proper times for injecting lime-water into the bladder and otherways using it, that the one may not interfere with the other; a thing hitherto passed over unobserved.

I heard Dr. ALSTON say, in the year 1749, (when I attended his lectures on the *materia medica* with great pleasure and advantage;) that a pound of lime-water might be given very safely for a dose, in short that it might be taken *ad libitum* *. Supported therefore by so good an authority, who never advances any thing that is not founded on faithful and repeated experiments, I recommend, as the only rule in drinking lime-water, that the patient should take it in such quantities as his stomach can easily bear; beginning, for example, with four ounces, or half that quantity, at a time, and afterwards gradually encreasing it, till, at length, it becomes so familiar that he can use it as common drink.

* At pleasure.

drink. And the dose I would repeat, not at medical or stated hours; but whenever the uneasiness occasioned by the last is entirely worn off, which will be sooner or later according to the particular constitution; and of this the patient is the sole proper judge.

It seems not a little entertaining to hear some regret, that lime-water is so liable to be altered by the constitution before it can arrive at the part affected; and yet they prescribe it at their medical hours *, the very times when there are the greatest chances against it.—It would, in my humble opinion, be more rational to order it at meals, and soon after:

D 3 for

* *Medical hours* are commonly reckoned, in the morning fasting, about an hour before dinner, about four hours after dinner, and going to bed.

for then the concoctive powers are most employed, then the particles of the urine are more crude, that is, less changed or assimilated by the powers of life. And surely lime-water has as good a chance for passing off in this way with little alteration as most aliments; especially since it has of itself a strong tendency to the kidneys.

FROM this I would infer, that lime-water may be given at any time, and that most advantage is to be expected from those draughts that are taken while the vascular system is loaded with fresh chyle.

SUCH as cannot bear lime-water on a full stomach, may then use it with equal, nay greater advantage, by way of clyster; as it will thus enter the blood without suffering any

any change from the action of the stomach. And the same course may be taken at any other time, when the patient, either thro' indolence, reluctance, or peevishness, does not drink it in sufficient quantity : or, perhaps, it may supply the place of drinking altogether. For half a pound of lime-water has, by my advice, been thus exhibited, and frequently repeated in a day, without occasioning any uneasiness except sometimes a small desire to go to stool immediately after the injection : but this inconveniency the patient effectually removed by lying in a horizontal posture, with his breech considerably elevated, for a few minutes * ; after which he went about his

* This, perhaps, may be a hint useful in practice with respect to clysters in general.

his business as usual.—And, tho' this method was persisted in for some days successively, he never had a stool extraordinary : nor could he, in other respects, observe any alteration upon himself, except that he made a good deal more urine than usual.

IF lime-water be used thus liberally, I would entirely lay aside the soap ; as frequently its most noted effects are, to pall the appetite, make the patient nauseate a much better medicine, and irritate the urinary organs that are already too much irritated, or, in case of ulcerations, to increase that disorder ; whereas lime-water is quite its opposite in all these particulars.—However, where soap is not contraindicated, and when the patient agrees with

with it, or wishes to use it, it may be taken, according to Dr. ALSTON's rule, "in such a quantity, daily, as will keep the belly soft, without purging more than the patient used to do in health;" since, as he very well observes, if it is hurried off by stool, it cannot act upon the stone *. But half an ounce of soap is generally more than sufficient for producing that effect †; a quantity too inconsiderable to expect great things from as a solvent.—However, the preventing costiveness is of very great consequence to a gravelish patient; as hard excrements increase their pains by pressing the tender coats of the bladder against the rough surface of the stone.

* Dissertation on quick-lime and lime-water, p. 25.

† Ibidem.

stone. And soap, when it may be used, is certainly preferable to any other known eccoprotic ; as it is found, by experience, greatly to exceed any of them in dissolving calculous concretions of the urinary passages. But even the small quantity mentioned, ought to be divided into several small doses, and given at proper intervals thro' the day.

So soon as the patient has begun this course, the proper quantity of lime-water should be injected into the bladder twice a-day ; namely, at night, having gone to bed ; and at the time in the morning after which he can conveniently ly till it be voided.

WHILE the injection is in his bladder, he ought to ly upon his back,

back, with his feet and breech higher than the rest of his body.

HE should take none of his medicines, and as little of any liquor as possible, after six o'clock at night, provided he goes to bed at ten, till he has passed the injection ; and then he may take a draught of lime-water (with milk if he pleases) and compose himself for sleep.

THE same regimen should be observed till the morning injection is evacuated ; and, during the rest of the day, he must follow the other methods of using lime-water.

ALL solvents of the stone are prime diuretics ; and thin liquors are apt likeways to run off by the kidneys : they are justly prohibited while the injection is in the bladder, and for some time before ; as they might

might oblige the patient to piss sooner than otherways he would do, and so greatly frustrate its design. Besides, the increased quantity of the urine would weaken considerably the injection.——And, as nothing gives a gravelish person stronger inclinations to make urine than motion, rest is, with great reason, enjoined.——The warmth of the bed helps also to diminish the quantity of the urine by promoting the cutaneous discharge.

THE inclination to make urine, in a healthy state, seems generally to arise, neither from an over-stretching of the coats of the bladder, nor any irritation produced upon them; but from the pressure of the urine upon the neck of that organ.——The following simple experiment

periment is a strong confirmation of this.

LET any one, having a desire to make urine, ly down upon his back with the lower parts of his body more elevated than the upper, he will then be sensible of that inclination abating considerably.

AND indeed it is not easy to conceive how any cavity, long habituated to a particular fluid, should ever be irritated by the quality of that fluid in a healthy state.—This is an objection to the doctrine of a *stimulus*, and an objection, hitherto untouched, so far as I have observed. But to return.

FROM what has been said, the reason for the posture recommended is obvious; to wit, that the patient may keep the injection as long and

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as

as easily as possible.—And, by the bye, even those who are taking medicines by the mouth, for stones in their bladder or kidneys, will do well to observe the same rule when a-bed. Because, in this way, there will be a greater *remora* of the urine in the kidneys; and so the virtues of the medicines carried along with it, will have more time to act sufficiently upon the stone:—likeways the urine can be detained longer in the bladder; which is necessary for the same reason.

It may perhaps generally be allowed that all this is reasonable: but some will object against throwing lime water into the bladder from the beginning of the course; because, say they, it may be proper, in the first place, to mitigate the pains,

pains, and take off the tenderness of the bladder ; after which the patient will, with less difficulty, be able to retain it when injected. But there is nothing near so efficacious or speedy in allaying these complaints as injecting ; therefore, in my humble opinion, the sooner it is begun, so much the better for the patient.—Nor is it necessary to weaken lime-water with any mucilaginous stuff previous to its being injected ; for, when applied alone to the tender eye, it gives very little uneasiness. How then can it be imagined to produce any remarkable irritation upon an organ that contains naturally a much more acrid liquor ?——But, to put this matter beyond all doubt, a few days ago (*March 10, 1754.*), some students of physic being present, I injected, for the first time, four ounces

ces of oister-shell lime-water without any mixture, into the bladders of *John Lindsay* and *William Auld*, two of Dr. RUTHERFOORD's clinical patients, who have been afflicted with the stone in the bladder for these several years past : and, notwithstanding that their symptoms were rather more severe than ordinary, on account of their having been searched with a catheter that day, which made them pass some blood, yet the former kept the injection near an hour, and the latter above two hours. Next morning I repeated the injection to the first, who kept it about two hours : but, the lime-water being then done, I could make no more trials at that time.

THE proper diet for a gravelish patient is prescribed with so much accuracy

accuracy and conciseness by the learned Doctor WHYTT, that I shall favour the reader with it in his own words.

“ DURING a course of lime-wa-
 “ ter and soap for the stone, the
 “ patient should abstain from all a-
 “ cid and fermented liquors, as vi-
 “ negar, wine, ale, beer, cyder, &c.
 “ For his drink he may have water
 “ and milk, or a ptisan made with
 “ roots of *althæa*, parsley and liquor-
 “ ice : but, if he has been accustom-
 “ ed to more generous liquors, and
 “ cannot confine himself thus far,
 “ he may be allowed a little moun-
 “ tain malaga, or some weak
 “ punch made without any acid ;
 “ but as the virtue of soap is much
 “ weakened when dissolved in
 “ punch, and intirely destroyed by
 “ spirits ; and, as quick-lime has

54 CURE OF THE STONE

“its nature considerably changed
 “by them, they ought not to be
 “drunk by themselves, nor even
 “in punch to any great quantity.
 “It will also be proper to be spar-
 “ing in the use of salt meats, and
 “honey, and to refrain from all
 “fruits that have any acidity or
 “sharpness; while, on the other
 “hand, milk and sugar, and ani-
 “mal food, with artichokes, aspa-
 “ragus, spinnage, lettuce, succo-
 “ry, parsley, purslane, onions,
 “leeks, cellary, turnip, carrot, po-
 “tatoes, radishes and green pease
 “may be safely used*.”

By persisting in this method, I
 am convinced, that a stone of con-
 siderable

* Essay on the virtues of lime-water in the
 cure of the stone, p. 118.—For greater
 variety of vegetables proper for the food of cal-
 culous patients, the reader may consult Dr.
 LOBB's treatise on dissolvents of the stone.

considerable bulk and firmness may be dissolved in a very few months. But, if there are any whose stomachs cannot bear the lime-water, or who have an invincible aversion at drinking it, while, at the same time, it cannot be used by way of clyster, (which, I believe, are circumstances that will never concur;) I am inclined to think, that, by observing the proper diet, and injecting the lime-water four times a-day, the stone in their bladder will be effectually destroyed, tho' it will certainly take longer time.

'Tis true, that sometimes, tho' very rarely indeed, the stone may happen to be of such a flinty hardness, that nothing less than the knife can give hopes of a radical cure: but, in my opinion, injecting lime-water into the bladder is preferable

preferable, as a palliative, to all the anodine and mucilaginous medicines yet thought of, by moulder-
ing down, in some degree, the angular points of the stone, healing up ulcerations occasioned by them, and hardening the coats of the bladder, so as to render them less sensible to any irritation for the future*.

Thus I imagine a person may live a long time tolerably easy and free of pain. And I am the more inclined to this opinion, as undoubted instances are to be found among authors, that people have had stones in their bladder, for many years, with

* According to Dr. WHYTT, lime-water, when injected into the bladder, will relieve gravelish pains intirely by its action upon the stone. Essay on lime-water. p. 139.

with little or no inconveniency*. Now, if this has been sometimes the case even without the assistance of a regimen †, what tranquillity may not almost any patient promise himself from the method just now proposed? and surely it ought to be of little consequence to a person whether he has a stone or not, provided

* GROENFELD mentions a gentleman, who, for many years, had been subject to the stone in his bladder; without any complaint, except sometimes a pain about the *perinæum*. After his death, a stone weighing twenty five ounces was found in his bladder. *Dissert lithol.* p 65.

† In BONETUS his *Sepulchr. Anatom.* (lib. iii. sect. 24. observ. 9.) we have an account of a large stone being found in the bladder of a person after his death, who never had any gravelish symptom.——And, in the 13th memoir of the academy of surgery at *Paris*, we are told, that a triangular stone of two or three drams weight was found in the left kidney of a Lady who had died of a malignant fever. This Lady never complained of any pain in that region.

vided it gives him no trouble *. However, if, notwithstanding this, a patient should be obliged to submit to the operation ; it only shows that this distemper, in common with almost every other, is sometimes in such a deplorable state, that it is judged more eligible to try a doubtful, tho' dangerous, remedy than none at all.

I have all along been supposing a confirmed stone : but, as the above method is very safe, and may easily be put in practice by any one, it

* Dr. PARSONS makes it a main objection against Mrs. STEPHENS's medecines, that stones were found in the bladders of several patients who were supposed cured by them, and were dead of other diseases. But, with the Doctor's leave, I think nothing can recommend them more ; since it is a clear proof that they are often the best palliative where they fail of making a radical cure.

it ought to be begun whenever the first gravelish symptoms appear, and then a cure may be expected, even to a certainty, in a short time. Thus, for example, if, after a nephritic paroxysm, a stone has reached the bladder, but is like to get no further on account of its bulk, lime-water should be injected immediately, and persisted in till the stone is rendered so small as to be expelled by urine, which may happen in a few days; and so an early period will be put to this most excruciating malady.

It is further observable, that I have been supposing the disease entirely in the bladder: but, when there are also stones in the bladder or kidneys, it is easy to see, that injecting, with respect to these, can be of no use; and, therefore, that the drinking

drinking lime-water cannot be dispensed with.

I shall conclude this head with remarking, that, as there is always hazard of a relapse, so when a patient has been once cured in this way, he ought to confine himself to a proper regimen of diet ever afterwards.

HAVING discussed what I would propose as a method of cure for the stone in the bladder, either with or without nephritic complaints, the following history well deserves a place here ; not only as injections had a considerable share in the cure, but also as it proves the bellows effectually to answer their design.—It is given me, with liberty to make it public, by the learned Doctor RUTHERFOORD, a Gentleman to whose friendship

friendship I am greatly indebted on many accounts.

“ A NGUS M’PHERSON, aged a-
 “ bove forty, came to the
 “ Royal Infirmary about the begin-
 “ ning of *February*, 1753 : and, be-
 “ cause he seemed to have a stone in
 “ his bladder, I immediately admit-
 “ ted him into my ward, as one
 “ of my clinical patients. He had
 “ been in great distress for above
 “ four years ; and commonly passed
 “ bloody urine, especially after ex-
 “ ercise : so that he was now great-
 “ ly emaciated by pain, sickness, and
 “ loss of blood. He had made his
 “ journey from the Highlands to
 “ town in great agony ; and, upon
 “ his arrival, complained of exqui-
 “ site pain about the neck of his
 “ bladder, had a frequent desire to

F

“ make

“ make water, and what he passed
 “ was deeply tinged with blood. I
 “ did not therefore think it advi-
 “ ble to sound him at this time, be-
 “ cause of the inflammation and con-
 “ striction of the parts; but prescri-
 “ bed the arabic emulsion, clysters,
 “ a dose of manna, &c. whereby, in
 “ some days, these symptoms were
 “ so much abated, that he could
 “ now bear the sounding with a ca-
 “ theter, by which a stone was dis-
 “ tinctly felt; and it seemed to be
 “ a large one.”

“ BUT, tho’ lithotomy had often
 “ been practised with success in the
 “ Infirmary, and tho’ the patient
 “ himself seemed willing to undergo
 “ that operation, yet I would not
 “ allow him to be cut, chusing ra-
 “ ther to make a fair trial of the
 “ power of lithontriptics.

“ AND,

“ AND, because remedies of this
 “ kind, when taken by the mouth,
 “ and mixed with the mass of blood,
 “ and afterwards with the urine,
 “ must necessarily lose a great part
 “ of their efficacy before they can
 “ reach the bladder, I had, for some
 “ time, wished for such an oppor-
 “ tunity of trying, if a stone may
 “ not be more speedily and success-
 “ fully dissolved by injecting the sol-
 “ vent liquor immediately into the
 “ bladder. I was the more encou-
 “ raged to push this experiment, as
 “ Mr. *Butter*, Clerk of the Royal
 “ Infirmary, had very ingeni-
 “ ously invented a machine, by
 “ which almost any one can easily
 “ throw a liquor into his own blad-
 “ der; and with less trouble than it
 “ can be done by the hand of ano-
 “ ther person.

“ I

“ I therefore ordered the patient,
 “ by the help of that instrument,
 “ and according to Mr. *Butter*’s di-
 “ rections, to inject four or five oun-
 “ ces of lime-water, every morn-
 “ ing and evening, into his blad-
 “ der; while, at the same time, I
 “ prescribed the internal use of
 “ soap and lime-water.

“ For the first four or five weeks
 “ that he followed this method, lit-
 “ tle alteration could be observed up-
 “ on his urine: but afterwards,
 “ when the quantity of the injected
 “ liquor was increased, and when
 “ he could retain it longer, both his
 “ urine and the lime-water when
 “ rendered, began to drop a copi-
 “ ous chalky sediment, which plain-
 “ ly showed that the stone was now
 “ in a state of dissolution.

“ His

“ His symptoms, which, from
 “ the first, had been continually,
 “ tho’ slowly, decreasing, abated
 “ more sensibly upon this phæno-
 “ menon. And, after he had been
 “ pretty easy for some weeks, he
 “ was again sounded about the mid-
 “ dle of *April*; when, upon care-
 “ ful searching, it was imagined
 “ that the nucleus of the stone
 “ could sometimes be felt by slight
 “ touches upon the catheter. And
 “ the patient said, he was sure
 “ that what remained of it was a ve-
 “ ry small bit; because he some-
 “ times had a feeling as if it was en-
 “ tering the *urethra*. He continued
 “ the same course a fortnight long-
 “ er; when the sounding was re-
 “ peated, and no relique of a stone
 “ could be felt: and, as he had no
 “ complaint, except, very seldom,

66 CURE OF THE STONE, &c.

“ a little pain and stoppage in ma-
“ king water, he grew impatient to
“ return home. I therefore dismis-
“ sed him, with orders to continue
“ the same course till those sym-
“ ptoms should entirely cease.

R E-

REMARKS

ON

LITHOTOMY.

FROM what has been said, and a number of other considerations, I am firmly persuaded, that there is scarce any one remedy which cures any disease with greater certainty, than the remedy in the method here proposed cures the stone in the bladder. Except, perhaps, in a case among ten thousand, where the stone may be of a flinty hardness, it promises every whit as successful a cure as cutting; and, at the same time, is attended with no sort of danger. I am also convinced, that Lithotomy, of all operations in Surgery, is the least necessary, and the most destructive.—On these accounts, therefore

therefore, I judge it my indispensable duty, as a lover of mankind, to put them on their guard against this cruel operation, by pointing out some of the most remarkable calamities consequent upon it.

I am, however, by no means addressing myself to the sons of *Æsculapius*; but to the unhappy sufferers who are unacquainted with the danger, and to those who are interested for their safety.

Cutting for the stone was reckoned so terrible an operation among the ancients, that physicians bound themselves by an oath never to perform it, but to leave it to those who made it the entire business of their lives *. Nor do the most skilful of the moderns seem to entertain

* *Hippocrates* his oath.

entertain a better opinion of it : for the great BOERHAAVE asserts, that the event is always doubtful, by reason of some things happening, which no sagacity could foresee, no art can remove *. And the experienced HEISTER says, that, if the structure of the bladder, and its true disposition, with regard to the adjacent parts, be not first well known, and the Surgeon well versed in the *encheiresis*, or necessary artifices to be used for cutting, and in extracting the stone, it is very possible that the patient may, thro' such defect, lose his life in the operation. And the same author further declares, that Lithotomy is precarious and dangerous, or its event at least very doubtful, not-with-

* BOERHAAVE's aphorisms, § 1437.

withstanding all the improvements which have been lately made on that operation by several celebrated Physicians and Surgeons; nor, continues he, is there any one method alone to be relied on, but all of them are practicable to more or less advantage; and therefore a prudent Surgeon ought to be well acquainted with the manner of performing all the methods *.—But, alas! how few of the many pretenders to this operation are thus qualified!

HOWEVER, that our arguments may carry along with them the stronger conviction, I shall omit mentioning the more obscure causes of destruction; and only take notice

* HEISTER'S Surgery, part 2. chap. cxi.
1. chap. cxliii. 40.

notice of some of those that are so obvious, as to be capable of being understood by any intelligent person of whatever profession; and, at the same time, may render the operation unsuccessful, even in the most favourable cases, where the patient is young and *seemingly* of a good habit, the operator very dextrous and of great experience in his art.

AND, that every thing may be set in the clearest point of view, I shall advance nothing in the way of reasoning that is not confirmed by similar examples, extracted from the most accurate and faithful observers, or supported by the sentiments of the most approved Lithotomists.

I chuse to take this method, that all may see with what reason I inveigh

weigh against, the operation called, *Lithotomy*. For, as the learned Dr. JURIN very well observes in a parallel case, if those who do a thing of this kind have good grounds for what they assert, they are to be commended for warning their friends against it: but if not, honour and humanity ought to restrain them from running down what is, or may be, serviceable to mankind *.

1.† Then the stone may be so large as to render its extraction impossible ‡; or if, with much difficulty,

* The case of JAMES JURIN M. D. p. 108.

† In our animadversions upon *Lithotomy*, regard is had chiefly to the *low* operations; as the *high* is now generally given up.

‡ A man, aged 25, was cut for a stone in his bladder; but the operator, to his surprise,

ty, this has been effected, the patient either dies immediately *, or soon after †.

G 2. INSTEAD

prize, was not able to extract it; even tho' he got a sufficient hold of it with the forceps. The patient died: and RUYSCH, upon opening the body, found a large stone so firmly grasped by the bladder, that there was only room for a few drops of urine. FRED. RUYSCH observ. anatomico-chirurg. centur. observ. 89.

* HILDANUS relates, that a stone, weighing 22 ounces, was, after great difficulty, extracted from the bladder of a youth aged 20 years; but he died in the Surgeon's hands. And the same author adds, that he has seen several examples of this kind. FABR. HILDAN. observ. chirurg. centur. iv. observ. 51. and lib. de Lithotom. vesicæ. cap. viii.

† SCHENKIUS mentions a patient, out of whose bladder a stone, weighing 14 ounces, was taken; and he died the third day after the operation. SCHENK. observ. lib. iii. de calculis vesicæ obser. 2. p. 471. a.

2. INSTEAD of one, there may be several stones ; which will render the operation tedious. In this case, the bladder is much exposed to accidents from the Surgeon's instruments ; the effects of which may be fatal *.

3. THE

* It is justly matter of general regret, that observators should be very fond of recording cases successfully treated, while they suppress the unsuccessful. In no disease is this more conspicuous than the present. A consciousness of which inconveniency induced me to say, that I should advance nothing against cutting for the stone, by way of reasoning, that was not confirmed by suitable examples, or *supported by the sentiments of the most approved Lithotomists*. And indeed, however others may think, I am inclined to be of opinion, that the sentiments of such good judges, as, by no means, can be supposed prejudiced against the operation, are, at least, as conclusive as the histories themselves ; since it will be upon numbers of such histories, that these very sentiments are founded.

DOUGLAS,

3. THE stone may so adhere, or be fixed in the bladder, that it will be impossible to extract it, without bringing

DOUGLAS, HEISTER, and others, therefore, say, that, in the operation of Lithotomy, the bladder is always subject to be hurt by the instruments. Whence inflammation and other bad consequences which may sooner or later cost the patient his life.—Now, if this will happen even when there is but one stone, there is surely much more reason to fear such an accident in the case of a number of stones, when the introduction and extraction of the instruments are more frequently repeated. However, I have not seen an example of this in any author that I have, as yet, looked into; except one in GROENFELD's *dissertatio lithologica*, p. 22. where an account is given of 42 stones having been extracted out of a man's bladder: but, as appears from circumstances, the patient certainly died of that operation, tho' the author does not mention it.

bringing on the worst consequences *.

4. THE stone may be contained within a sac formed in the coats of the bladder ; which will occasion the extraction or laceration of that organ. Hence inevitable death †.

5. BUT,

* HEISTER quotes a fatal instance of this kind from SERMESIUS.—Mr. MACGILL gives another, where the stone was so much engaged in the bladder, under the arch of the share-bones, that, even after the patient's death, he was not able to bring it away till he sawed these bones asunder. *Traité de la Taille au haut appareil, par M. MORAND.*

† In the 13th memoir of the Academy of Surgery, there are many cases where the operation proved destructive on account of encysted or rather enchased stones. I shall only mention one of them.

A man, aged 30 years, was cut, and a stone weighing 3 ounces extracted. But, M. DE LA PEYRONIE, the Surgeon, from other considerations, as well as seeing the stone bloody, and some ends of lacerated vessels,

5. BUT, supposing the operation to have been dextrously, and, to appearance, safely performed, yet the patient often loses the faculty of retaining his urine ever afterwards *: or fistulous ulcers are formed

G 3

ed

vessels, which formed a kind of fringe about it, made a bad prognostic of the success of the operation; as the stone seemed to have been taken from a particular cell of the bladder. Accordingly, some hours after the patient was dressed, there appeared an hæmorrhage from the internal part of the bladder, which nothing could stop; and the patient died about eighteen hours after the operation.

This hæmorrhage proceeded from the vessels which had been torn when the stone was detached from its cell.—The bladder, and the cavity in which the stone had been contained, were, upon opening the body, found prodigiously dilated, and full of coagulated blood.

* MERY, DOUGLAS, HEISTER and others, are of this opinion.

ed in the *perinæum*, thro' which the urine is constantly drilling; by which means he is rendered miserable for life *: and sometimes there are sinuses which make burrows in the neighbourhood of the bladder, and lay the foundation of a loathsome and incurable consumption †.

6. IF the patient has also stones or gravel in his kidneys, which is often the case, it will be needless to perform the operation; since it is submitting to a most dangerous experiment

* MERY, DOUGLAS, HEISTER and many others, are of this opinion.

† It is sufficient to destroy the patient that blood be retained in the bladder; or that, by means of the wound, it insinuates itself into the cellular texture, and there becomes stagnant and corrupted. M. HOUSTET and M. DE LA PEYRONIE, in the *French* memoir already quoted.

periment for removing the malady but in part *.

7. BUT, granting the patient to have recovered a good state of health, all gravelish symptoms being gone; yet there is no disease more subject to a relapse than this: and therefore, a person, after all the hazard he has run, at best, cannot promise himself a twelve month's relief from the racking pains of the stone †.

FROM

* A stone, weighing nine ounces, was taken out of the bladder of a confectioner; and he recovered. But, not long after, he died of a suppression of urine, proceeding from two small stones, which, in their passage from the kidneys to the bladder, stuck about the middle of the ureters. *Les œuvres D'AMBROISE PARE livre xxiv. chap. 19.* See *BONETI sepulchr. anatom. lib. iii. sect. 24. observ. 6. § 9.*

† I remember a lad, who had been three times cut, and freed from the stone
by

FROM what has been said, it may appear, that the case of young children afflicted with the stone is deplorable; as injections into the bladder have been declared useless to them, and cutting for the stone has been demonstrated to be at all times doubtful and dangerous. But I can from experience say, that very few children die of this operation, if

by RAW. And, to instance one case out of many, a certain merchant near *Norimberg*, was obliged to be cut four times; a new stone being formed every year, notwithstanding he was constantly under the care and treatment of a prudent surgeon. — In like manner, Mr. DENYS mentions a man who was five times cut for the stone, a very large one being extracted at each operation. HEISTER'S Surgery, part 2. chap. cxliii. 42.

if any sort of justice be done them* ; for their constitutions are generally healthy, their juices balmy and sweet, and they are under no apprehensions about death ; all which circumstances must greatly favour their recovery from any disorder whatever. Besides, they are sooner cut than most adults are, by reason of their natural impatience under trouble. Hence the stone will, for the most part, be small. Nor will it be so apt to adhere to the bladders of such patients ; as in them a quicker and more copious secretion of slime is made upon the inner surface of that organ.—

Beside,

* Agreeable to this are the sentiments of the celebrated MORAND, an author of great experience in these matters. *Memoires de l'Academie Royale des Sciences* 1740. edit. 4to. p. 189.

Beside, what is called, cutting on the gripe is, or at least ought to be, the method commonly practised upon very young subjects ; which as it is the most antient, so it is the most simple and the most safe.

I shall now conclude with remarking in what other cases the bellows may be useful. And,

1. As it is the best adapted, of any thing hitherto offered for the purpose mentioned, so it will be equally fit for conveying the proper medecines in other diseases of the bladder.

2. IT seems very proper for injecting liquid medecines in disorders of the womb.

3. I shall appeal to experience, whether it will not be a safer, more
cleanly

cleanly and expeditious method for exhibiting clysters than the one commonly practised. But, for this last purpose, the whole instrument must be larger *, and the pipe to be introduced may be of the same form with the crooked one in the plate, except that its body must be streight.

IN all these cases, a rational patient can operate with most ease and success upon himself; which will be very agreeable to many. And the posture

* The instrument, from which the figure is drawn, when full-mounted, weighs about $5\frac{1}{2}$ ounces. And, above six months ago, I gave one to a regimental surgeon (now in *Ireland*) by which a clyster of an *English* pint could be injected; and yet, to the best of my remembrance, it did not weigh ten ounces.

ure recommended for injecting into the bladder, seems to be the properest for all.

F I N I S.

Fig. 9.



Fig: 6.



B

C

Fig: 7.



A

B

C

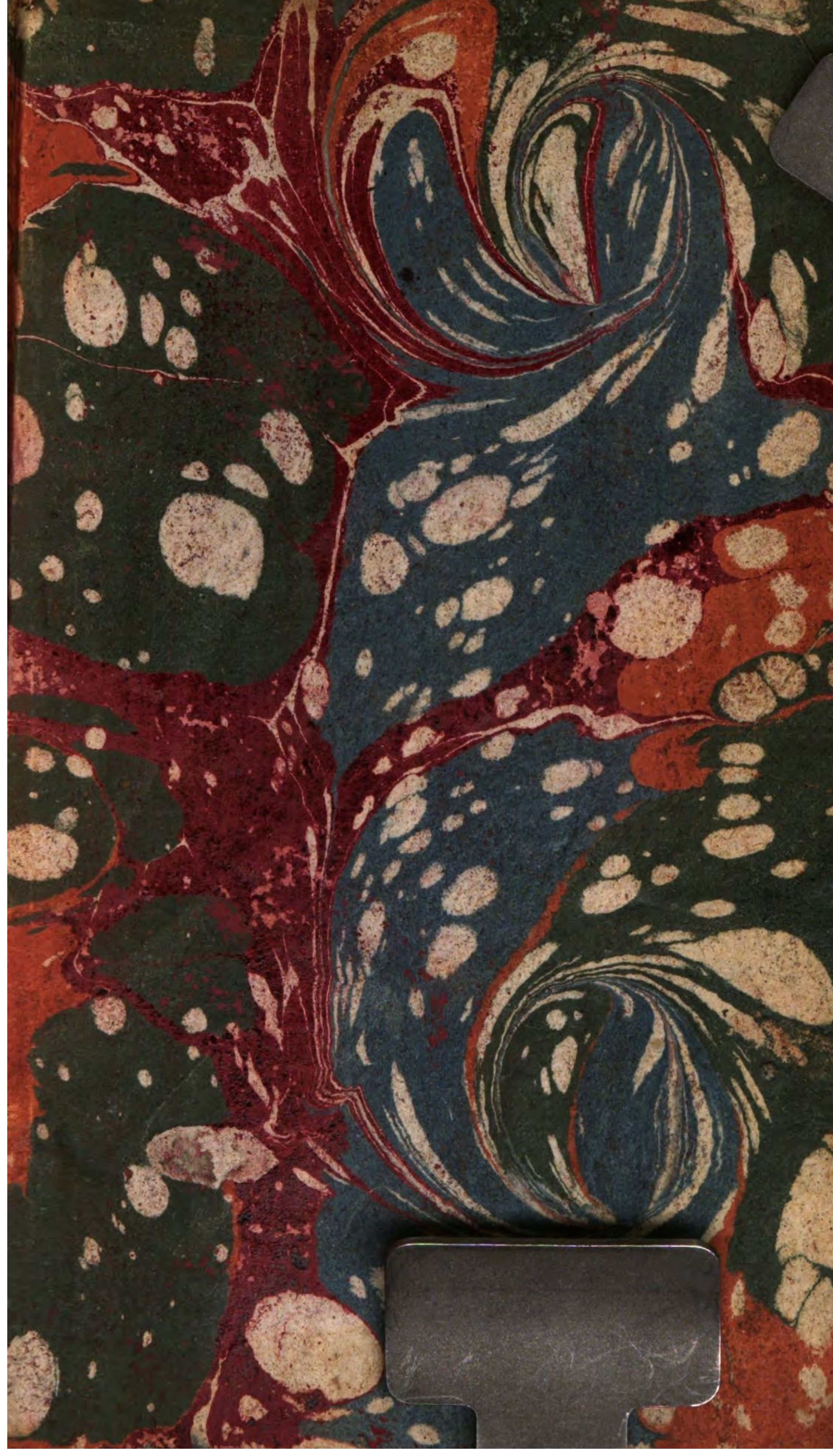
D

Rich. Cooper Del & Sculp

D

C







Butler, William

A Methode of cure for the stone

Edinburgh 1754

Chir. 49

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